

Some Aspects of Byzantine Military Technology from the Sixth to the Tenth Centuries

J. F. HALDON

Byzantine military technology remains to be examined thoroughly, despite its importance in demonstrating the Byzantines' ability to absorb ideas and practices from areas outside the Empire as well as developing their own traditions. This article examines arms and armour from the mid-sixth century to the end of the tenth century and puts the military panoply into a wider context, that of the development of offensive and defensive military equipment in Europe and the lands to the north and east of the Empire. Finally, it examines the relationship between military affairs and the economic and political situation of the Empire and attempts to account for the use of particular weapons and methods of equipping the soldiers at particular times.¹

The most significant factor in the development of Roman tactics before Justinian was the rise in importance of heavy cavalry: troops armed with long lances and protected by scale

1: See E. Darkó, 'Influences touraniennes sur l'évolution de l'art militaire des Grecs, des Romains et des Byzantins', *B*, x (1935), 443–69; xi (1937), 119–47; *idem*, 'Le rôle des peuples nomades cavaliers', *B*, xviii (1948), 85–97; and for works which examine Byzantine weapons and armour, see C. W. Oman, *The Art of War in the Middle Ages*, I (London, 1898–1924), pp. 22ff; F. Lot, *L'Art Militaire et les Armées au Moyen Age en Europe et dans le Proche Orient*, I (Paris, 1946), pp. 27ff.; F. Aussaresses, *L'Armée Byzantine à la fin du 6^e siècle d'après le Stratégicon de l'Empereur Maurice (Bibliothèques des Universités du Midi*, fasc. xiv, Paris, 1909). The last four authors did little more than paraphrase the various *tactica* where arms and armour were concerned. See also A. Pertusi, 'Ordinamenti militari, guerra in Occidente e teoria di guerra dei Bizantini (secc. VI–X)', *Ordinamenti militari in Occidente nell'alto medioevo* (Spoleto, 1968), 631–700.

and lamellar armour, often carrying bows as well as shock weapons.² The Romans reacted to the appearance of these troops (used among the Sarmatians, Parthians and Sassanian Persians) by recruiting auxiliaries from among their erstwhile enemies and then by developing such forces of their own.³ But when the army had grown accustomed to these developments in the later fourth century the emphasis changed again and archery predominated,⁴ a change promoted by the Huns, whose arrival forced both Persians and Romans to alter their tactics once more. In the Roman world, this eventually led to the development of Belisarius' 'composite' cavalryman, a soldier who was equally at home with both bow and lance, and whose appearance shows that the Byzantines had the ability to adapt tactics and armour to suit the new mode of warfare, an ability which was to save them from disaster at the hands of the Avars. Byzantine adoption of the Hun bow and of the method used to draw it, incidentally, gave them a considerable advantage over the Persians, and seems to have contributed to Byzantine successes in this field in the later sixth and early seventh centuries.⁵

This reorganization, begun on a small scale during the reign of Justinian, had by the end of the century been officially recognized and encouraged, stimulated, it seems, by the arrival of the Avars.⁶ The new cavalry of Justinian's time and after

2. J. W. Eadie, 'The Development of Roman Mailed Cavalry', *JRS*, lvii (1967), 161–73.

3. See Eadie, *op. cit.*, 167f.; and the descriptions in Ammianus Marcellinus, *Works*, ed. and trans. J. C. Rolfe (Loeb, London/Cambridge, Mass., 1935), xvi, 10, 8; and Julian, *Letters and Works*, ed. and trans. W. C. Wright (Loeb, London/Cambridge, Mass., 1954), *Oratio*, i, p. 96, of Constantius' heavy cavalry. See also Vegetius, *Epitoma Rei Militaris*, ed. C. Lang (Teubner, Leipzig, 1885), iii, 23; 24.

4. On this development see A. D. H. Bivar, 'Cavalry Equipment and Tactics on the Euphrates', *DOP*, xxvi (1972), 273–6, 284f.

5. Bivar, *loc. cit.*

6. For reforms in the 580s and after, see Menander Protector, in *Fragmenta Historicorum Graecorum*, IV (ed. C. Muller, Paris, 1851), frg. 58, 9–17 (p. 113), and Maurice, *Strat.* (Mauricius, *Artia Militară*, ed. H. Mihaescu [Bucharest, 1970]), proem. 2. On the various types of composite bow, see E. Rausing, *The Bow* (*Acta Archaeologica Lundensia*, vi [1967]). For its construction, see F. E. Brown, 'A Recently Discovered Compound Bow', *Seminarium Kondakovianum*, ix (Prague, 1937), 1–10; R. Payne-Gallwey, *Projectile-Throwing Weapons of the Ancients: with a Treatise on Turkish and other Oriental Bows* (London, 1907). There

therefore constitute an important break with the past. As Procopius points out, many despised or mocked at the new form of warfare as innovatory and ineffective,⁷ yet its importance for the survival of the Empire during the sixty or seventy years which followed was considerable. This is quite clear from the great emphasis placed upon these troops in the *Strategikon* attributed to the Emperor Maurice, compiled in the 580s or 590s, and on the role of the composite soldier.

There were three basic types of armour available in the sixth century: scale armour and its sub-types, lamellar and splint armour; laminated (i.e. plate); and mail (i.e. interlocked metal rings).

Next to the simplest defences of padded linen or boiled leather, scale armour seems to be the oldest form of protective equipment. It was effective against both shock and penetrative blows, but somewhat cumbersome, and was used on the whole by infantry only, once a more flexible form of defence was available.⁸ It was widely used among both nomadic and settled peoples from the middle of the second millennium B.C. at least, until the third and fourth centuries A.D., after which its popularity waned, in the west, as the result of the development of a more advanced form of scale armour and the increase in the production of mail.⁹ A second type of scale armour had holes

is some dispute as to whether the Byzantines really adopted the Hun bow or not; but judging from Procopius' description and that of the anonymous treatise on archery (see below) it is very probable that they did. See Procopius, *Wars*, ed. H. B. Dewing (Loeb, London/Cambridge, Mass., 1940), i, 18. 32.

7. *Wars*, i, I. 9–15.

8. Scale armour was constructed from a number of small plates of iron, bronze, bone, wood, horn, or leather, depending upon the natural materials most easily obtained, which were pierced at the top and sewn on to a backing garment, usually leather or linen. As a result of the sewing, the backing naturally became puckered and stiff, preventing easy movement; consequently, most of the scale defences we know of are fairly short, having either no sleeves at all or very short ones. For examples, see the second-century B.C. fresco at Pantikapaion, Kertch, in M. Aschik, *Sur une Chambre Sépulcrale de Pantikapée, ornée de Fresques* (Odessa, 1845), pl. iv.

9. For a general note on scale armour and its history, see H. Russell-Robinson, *Oriental Armour* (London, 1967), pp. 2–7. For finds of Scythian scale, see E. H. Minns, *Scythians and Greeks* (Cambridge, 1913), pp. 183–7, 225, 231. For representations of Scythian and Sarmatian soldiers wearing such armour, see *Compte Rendu de la Commission Impériale d'Archéologie* (1871), *Supplément* by L.

punched in the sides of each plate as well as the top, so that the plates could be tied in rows before being fixed on to the backing,¹⁰ the next stage before the appearance of lamellar armour. The latter first appears in Assyria and in Cyprus in the seventh century B.C. or shortly before,¹¹ and seems to have spread quickly to the steppe lands and the areas east of the Iranian plateau. It was much more flexible than scale, but retained the same defensive qualities. It was constructed from a large number of small plates, usually long and thin, but sometimes square, laced together with continuous thongs, and overlapping upwards. Because the plates were not attached to a backing, there was a considerable increase in the flexibility of such

Stephani, 295–312 and pls. vi, ix, x (frescoes of the first century A.D. or later); *Compte Rendu* . . . (1874), 115, fig. 2 (a second- or third-century B.C. fresco); stylized Sarmatian soldiers are also shown in Trajan's column: see C. Cichorius, *Die Reliefs der Traianssäule* (Berlin, 1896 and 1900), pls. xxiii and xxviii; and for Roman booty, pls. ii and iii. For Roman scale, see pl. lxxxvi and also C. Caprino et al., *La Colonna di Marco Aurelio* (Roma, 1955), figs. 29, 30, 42, 43, 54, 90, etc.; A. Guiliano, *Arco di Costantino* (Milano, 1955), figs. 6, 18, 20, 32; and F. B. Florescu, *Monumentul de la Adamklissi Tropaeum Traiani* (Bucharest, 1909), figs. 186b, 196. Cf. G. Webster, *The Roman Imperial Army* (London, 1969), pls. iv, v. For scales from Roman sites, see M. von Groller, *Der Römische Limes in Österreich II* (Vienna, 1901), cols. 85–95, pls. xv, xvi; IV (Vienna, 1903), cols. 103–4, fig. 46. For scale in Persia and the Middle East, see Bivar, *op. cit.*, pp. 273–4. Note also the two scale horse-trappers, one of bronze, the other of iron, excavated at Dura Europos, dating to the third century A.D., in M.I. Rostovtzeff, ed., *The Excavations at Dura Europos: Preliminary Report of the Second Season of Excavation* (New Haven, 1931), pp. 194–200. Cf. the graffito of a heavily armoured horseman at Dura, showing the horse armed with a similar trapper, in R. Ghirshman, *Iran: Parthians and Sassanians* (London, 1962), fig. 63c; and the paintings at Khalchayen in central Asia, in A. Belenitsky, *Central Asia* (Geneva, 1968), p. 101, where again the horse is armed with a scale trapper. Cf. the second- or third-century A.D. rock relief at Tang-i-Sarwak in north-east Iran, in Girshman, *op. cit.*, fig. 69. For scale cuirasses worn in conjunction with laminated arm- and leg-guards, see the Sassanid reliefs at Naqsh-e Rostam, in E. F. Schmidt, ed., *Persepolis III* (Chicago, 1970), pls. 89, 91, 93, 95.

10. Cf. Russell-Robinson, *Oriental Armour*, p. 4, fig. 2; *Persepolis II* (Chicago, 1957), pl. 77, nos. 9, 10; B. Thordemann, 'The Oriental Splint Armour in Europe', *Acta Archaeologica Copenhagen*, IV (1933), fig. 20. Thordemann gives a good summary of the history and use of lamellar, pp. 125ff.

11. A. Westholm, 'Cypro-Achaic Splint Armour', *Acta Arch. Copenhagen*, IX (1938), 163–73; B. Laufer, *Chinese Clay Figures*, part one: *Prolegomena on the History of Defensive Armor* (Chicago, 1914), pp. 258–91. For a general note on the origins of this type, see especially pp. 273–4.

armours, and they were particularly favoured by the steppe-dwellers. Finds and illustrations of such armours increase from the first century B.C. although it never made much headway in western Europe. In the east, however, it soon became the most common form of armour, where it had a long history.¹² There is little evidence to suggest that the Romans made much use of lamellar until the sixth century, when they (and probably the Persians) seem to have adopted it on a large scale, under Avar influence.¹³ In western Europe only a few finds, mostly from Viking graves of the tenth century, have been made,¹⁴ probably a product of Magyar rather than earlier influence. In Italy, notably at Castel Trosino, a few finds of Lombard lamellar dating to the seventh century have been made, a development which must have been the result of both Byzantine and Avar influences.¹⁵ In the east, on the other hand, where it remained in use until the nineteenth century, finds are frequent.¹⁶

12. For lamellar such as was used among the nomads, see the Pantikapaion fresco in Aschik, op. cit., pl. iv, where several of the soldiers wear ankle-length coats of lamellar; also the Khalchayen fresco in Belenitsky, op. cit., p. 101. For finds of lamellar in Eurasia and Korea, see Laufer, op. cit., pp. 35, 201–36; Bivar, op. cit., 274, and n. 8; Thordemann, op. cit., 127ff., 146, n. 40; W. Arendt, 'Ein alttürkischer Waffenfund aus Kertsch' *Zeitschrift für Historische Waffenkunde*, XIII (July 1932), figs. 3, 3a, 3b; F. Altheim, *Attila et les Huns* (Paris, 1952), pp. 21–4. For lamellar in Persia and Europe, see the Dura preliminary report, second season, loc. cit., and the lamellar represented on a mid-third-century Palmyrene relief, in Ghirshman, *Iran: Parthians and Sassanians*, fig. 10. For finds of Roman lamellar of a similar period, see von Groller, op. cit., II (1901), cols. 85–95, pls. xv, xvi; IV (1903), fig. 47; VI (1905), fig. 56/3; VII (1907), fig. 11/12; IX (1908), fig. 10. Both the Romans and the Parthians were fully acquainted with lamellar by this time.

13. For the Roman material, see below. For the Persian evidence, note the lamellar horse trapper of Chosroes II depicted on the relief at Taq-i-Bostan; the warriors fully equipped with such armour shown on a silver plate of the sixth century; and the fragments of lamellar excavated from the site at Kasr-i-Abu, near Shiraz. See A. U. Pope, ed., *A Survey of Persian Art* (London/New York, 1938–9), IV, pl. 161a; E. A. Gardner, 'Preliminary Report of the Excavations at Kasr-i-Abu', *Bulletin of the Metropolitan Museum of Art* (December 1934), sect. 2, fig. 11; for the plates, see A. von Le Coq, *Bilderatlas zur Kunst- und Kulturgeschichte Mittel Asiens* (Berlin, 1925), fig. 74.

14. See Thordemann, op. cit., p. 129; and for its use at a later date, J. Hewitt, *Ancient Armour and Weapons in Europe* (London, 1855), pp. 132ff.

15. Russell-Robinson, op. cit., p. 9.

16. European commentators noted its use among the Mongols. See *The Texts and Versions of John of Plano Carpini*, ed. C. R. Beazley (London, 1903), pp.

Splint armour is related to lamellar. It consists of a number of long plates tied together or sewn on to a backing, forming armour for arms, legs, or torso. Like lamellar and scale armours, the splints could be made from a variety of materials, usually of iron, bronze, and wood.¹⁷ Such armour was used by the Scythians and later the Sarmatians from the fifth century B.C. and remained in use in Europe and Asia until well after the twelfth century A.D.¹⁸ It seems to have been especially popular as a form of defence for cavalymen, at least when combined with mail or scale armour.¹⁹

89, 124; and *The Journey of William of Rubruck*, ed. W. W. Rockhill (London, 1900), p. xv. For Japanese lamellar, see the chapter devoted to this subject in Russell-Robinson, op. cit.

17. On Byzantine armour of wood, see below, n. 60. Wooden armour was used by the nomads and by some north American Indian tribes. See Laufer, op. cit., pp. 204, 276. For further examples, see G. C. Stone, *A Glossary of the Construction, Decoration and Use of Arms and Armor* (New York, 1934), p. 54, fig. 71; p. 67, fig. 87.

18. For Scythian examples, see E. A. Gardner, 'Ornaments and Armour from Kertch in the New Museum at Oxford', *JHS*, v (1884), 65, pl. xlv, 1; *Antiquités de la Région du Dnièpre* (in *Collection B. Khanenko*, Kiev, 1899), II, pp. 7, 19, and pl. vii. Also G. Arwidsson, 'Armour of the Vendel Period', *Acta Arch. Copenhagen*, X (1939), 54, n. 35, where other finds of splint from Kertch are detailed. For Avar splint greaves/shinguards, see Arendt, op. cit., figs. 1b, 3b.

19. The Dura graffito shows a rider with a double row of splints around his trunk, with the area below and above protected by mail or scale armour joined to the splints. His limbs are protected by laminated defences and he wears a conical helm with an aventail of scale or mail. For a similar outfit, compare the royal figures in the Naqsh-i-Rustam reliefs (above, n. 9). Such an outfit was adopted by the Romans during the fourth century: compare the descriptions given by Ammianus and Julian (n. 3) with the Dura graffito. Similar armours have been excavated from seventh-century A.D. Vendel graves in Sweden (see G. Arwidsson, 'Armour of the Vendel Period', 38ff.) and from Merovingian graves at Schratzheim in Bavaria (ibid., 32, n. 3). The northern peoples of the migration period were keen to obtain or copy Roman armour, as their adoption of late Roman helmet styles illustrates. See G. Arwidsson, 'A New Scandinavian Form of Helmet from the Vendel Time', *Acta Arch. Copenhagen*, V (1934), 31–59. Compare the parade helmets described in Ammianus and Julian and the second-century helmets excavated from Roman forts at Newstead and Ribchester, in J. Curle, *A Roman Frontier Post and its People* (Glasgow, 1911), pp. 179–80, pls. xxix, xxx; Webster, op. cit., pl. xxii. Cf. the helmet of Chosroes II at Taq-i-Bostan (in Pope, op. cit., pl. 161a); for a better view and comparison, see Russell-Robinson, op. cit., fig. 11; and some of the Vendel helmets in Arwidsson, 'A New Scandinavian Form of helmet'; for

Laminated armour is similar in many ways to splint armour and is first described by Xenophon.²⁰ It is illustrated slightly later in the third-century B.C. Pergamum reliefs²¹ and consisted of a series of curved or ring-shaped laminations fitted on to a backing—a shirt or sleeve of leather, for example—so as to overlap horizontally. The Roman *lorica segmentata* utilizes this technique;²² its flexibility is emphasized by the fact that soldiers thus equipped are shown entrenching in a scene on Trajan's column.²³ At the bottom of the column complete coats are shown among a pile of booty taken from the Sarmatians and Dacians, suggesting that it was well known to both sides.²⁴ Leg- and arm-defences of laminated armour were in use from Xenophon's time and before by the Persians, and were later employed by the Parthian, Roman, and Sassanid armies.²⁵ Pieces of such armour have been excavated from Roman sites at Newstead and Carnuntum, and are illustrated on the graffito at Dura, the reliefs at Naqsh-i-Rustam, at Firuzabad and on a Palmyrene sculpture of three war-gods, who wear lamellar cuirasses and laminated arm-guards.²⁶ It is clear that such arm-defences were used by the Romans and until at least the seventh century A.D. by the Persians.²⁷ After this time, it disappears from

other attempts to imitate Roman equipment, see Arendt, *op. cit.*, figs. 6 and 7. The composite armour of scale or mail and splints proved to be one of the most durable forms of defence in the east, where it was especially popular in Persia, central Asia, and China: see Arwidsson, 'Armour of the Vendel Period', 54, 59; Russell-Robinson, *op. cit.*, pp. 31–3, 61–3.

20. *Art of Horsemanship*, ed. and trans. E. C. Marchant (Loeb, London/Cambridge, Mass., 1946), xii, 5.

21. Russell-Robinson, *op. cit.*, p. 13, fig. 6b.

22. Webster, *op. cit.*, pp. 123–6.

23. Cichorius, *op. cit.*, pls. xii, xiii, xviii, etc.

24. Cichorius, *op. cit.*, pls. ii, iii; Florescu, *op. cit.*, figs. 196, 197, 199, 201, 202, where laminated arm defences are worn by Roman auxiliary troops.

25. See n. 24, and the laminated 'sleeves' of the soldiers in the Pergamum reliefs (Russell-Robinson, *op. cit.*, fig. 6b).

26. For Newstead, see J. Curle, *op. cit.*, pp. 157–8, fig. 11; for Carnuntum, see von Groller, *op. cit.*, II (1901), pls. xvii, xx, 6–10; for the Dura graffito, Ghirshman, *op. cit.*, fig. 63c; for the Naqsh-i-Rustam reliefs see n. 9 above; and for those at Firuzabad, see Ghirshman, *op. cit.*, figs. 165, 166. For the Palmyrene relief, see Ghirshman, *op. cit.*, fig. 84.

27. See the silver plate in Le Coq, *op. cit.*, fig. 74, where two dismounted warriors are shown, their legs encased in such defences. See also the references of Julian and Ammianus above, note 3.

literary and other sources, although a form of it was revived in the thirteenth century in western Europe.

Finally, there is mail, which is not related to any of the above types. The subject has been reviewed recently by Bivar,²⁸ who shows that by the fourth century mail was rapidly becoming the standard armour within the Roman and Sassanid Empires, where it was worn either by itself, or in conjunction with some other form of armour.²⁹ It was used to a large extent by Byzantine troops, when it was available and when it could be afforded. Naturally, it was not produced by nomad peoples, since its production required steady supplies of iron, a knowledge of wire-drawing, and a great deal of time and skill. The nomads chose more easily produced forms which were just as effective, although where they could obtain mail, through raiding, trade, or as gifts, they were not reluctant to do so.

Information on how these types of armour were used comes from a number of written sources. Two anonymous sixth-century treatises deal with archery, and strategy and tactics respectively.³⁰ The latter follows earlier patterns but describes the contemporary cavalry and infantry equipment.³¹ Add to it the descriptions of Procopius and the later sixth-century material of Maurice's *Strategikon*, and we can obtain a reasonably accurate picture of the Byzantine soldiers' panoply at this time.

From Procopius, we learn that the cavalry trooper wears armour for his body and legs, his (mail) coat reaching to his knees.³² From his right side hangs his quiver and arrows, from his left his sword. In addition, he carries a spear or lance, and strapped to his left shoulder is a small, circular shield, without a handle, to protect the face and neck. He carries no shield.³³ His

28. Op. cit., pp. 276–8.

29. For a further introduction to mail, see Laufer, op. cit., pp. 237–57; on mail and its construction, see Russell-Robinson, op. cit., pp. 10–11, 12, fig. 5; A. D. H. Bivar, *Nigerian Panoply* (Lagos, 1964); Stone, op. cit., pp. 424–30, 36ff.

30. See A. Dain, 'Les stratégistes Byzantins', *Travaux et Mémoires*, II (1967), pp. 317–92, for the most detailed and comprehensive examination of these tactica.

31. Anon., *Περί Στρατηγικῆς* in *Griechische Kriegsschriftsteller*, ed. H. Köchly and W. Rüstow, II (Leipzig, 1855), ii, pp. 42–96: xvi, *περί ὀπλίσεως* xvii, *Περί ἱππικῆς ψάλλαγγος* --.

32. *Wars*, i, I, 9–15.

33. This small face-guard is yet another example of the Byzantines adopting

horse wears no armour, so affording mobility, the prerequisite for a horse archer. Procopius goes on to describe his great skill as a horseman, his ability to fire while moving (both advancing and retreating), and the strength of his method of handling the bow.³⁴

This description is improved by that of the anonymous treatise. From this, we learn that soldiers must wear helmets, corselets, and leg-armour and infantry also carry shields. The author is not explicit but seems to envisage mail as the chief type of armour used, for he recommends that soldiers wear a jacket³⁵ not less than $\frac{3}{4}$ " thick, in order to absorb the shock of blows and to prevent any weapons which do pierce the armour (*τὸν σίδηρον*) from doing too much harm. For although mail is light and very strong, when made up of closely woven links, it is a poor shock-absorber, and therefore requires additional padding. These details strongly suggest mail, especially as he specifies what is to be worn when mail is not available. In such cases, the soldiers are to wear *ζάβαι* (long, knee-length coats) and *θώρακες* (a more general term meaning breastplate/armour for the trunk, what was later called the *κλιβάνιον*) and helmets of felt or leather.³⁶ Again, a thick jacket must be worn to give added protection.³⁷

Further details given by the anonymous treatise are that the shields of the infantry are to be seven spans, or 63", in diameter,³⁸ so that each man holding a shield partly covers his neighbour in the line. Those in the front rank were to have circular metal plates at the centre of their shields, with a spike protruding, 3" in

nomad panoply along with nomad tactica. The Chinese T'ang annals record that the Kirghiz also strapped a small shield to their shoulder for a similar purpose. See Laufer, *op. cit.*, p. 204. Persian miniatures of the thirteenth century also illustrate soldiers similarly equipped, according to the Mongol fashion of the time. See Russell-Robinson, *op. cit.*, p. 33, figs. 17a, b. The Byzantines must have adopted this from the Huns.

34. On this, see the anonymous treatise *Περὶ τοξείας* (in Köchly and Rüstow, *op. cit.*, pp. 109–208, i. 7; i. 9; and Bivar, *op. cit.*, pp. 284–5.

35. xvi. 4, *μάτιον*.

36. xvi. 9. On leather/felt head armour, see below, n. 130. Felt armour was common in the east, and was used by the Sassanid cavalry. See Laufer, *op. cit.*, pp. 290, 292. See Theophanes, *Chronographia* (de Boor), p. 318, 28.

37. xvi. 9. *περιστηθίδιον*.

38. On Byzantine measurements, see E. Schilbach, *Byzantinische Metrologie* (Munich, 1970), pp. 16ff. A *dactyl* was $\frac{3}{4}$ ", a *palaistē* or palm 4 *dactyls* or 3", and a *spithamē* or span 3 *palaistai*, or 9".

length. Helmets were also to have spikes, 2" high. Spears were to be long enough for those in the fourth rank to use in battle—probably about 12' long, as later *tactica* envisage.³⁹ Those behind the first four ranks were to have missile weapons such as javelins, which were to be hurled over the heads of the men in front.⁴⁰ Strangely, bows are not mentioned, perhaps because this treatise, although brought up to date in its main details, is clearly based on older traditions and older tactics.

The cavalry were to have the same defensive equipment as the infantry, but those in the foremost ranks were also to have their horses protected by armour for the neck, chest, and flanks of the animal.⁴¹ The horses' feet were to be covered by metal plates (iron) to afford protection from spikes and caltrops.⁴² The horse-armour was of iron, probably like the scale trappers found at Dura Europos, although felt trappers, such as those used by the Sassanian cavalry, may also have been employed.⁴³

No mention is made of the offensive weapons of the cavalry, and very little of those of the infantry, but Procopius supplies the want. The cavalry of Belisarius' campaigns are generally equipped with either lance or bow, or both, with a sword and sometimes a small shield; the infantry have shields, spears and swords and the lighter troops have javelins or slings and sometimes bows.

Mail and scale defences seem to be most common, for there is as yet no evidence for the widespread use of lamellar. The 'greaves' detailed by the anonymous treatise and by Procopius are unlikely to have been the moulded greaves of an earlier epoch, partly because they would have been heavy and expensive, and partly because laminated and splint defences, such as were worn by the Persian troops, would have been more familiar at that time, and cheaper to produce. Hide padding is also effective as leg-armour, and seems to have been used on a large scale—the anonymous author includes greaves in his list of armour that is to be constructed from leather or felt where iron is not available.⁴⁴

39. See below on the tenth-century treatises.

40. xvi. 8.

41. xvii. 3.

42. xvii. 4.

43. For felt trappers, see the Firuzabad reliefs, especially those depicting Ardashir I and Shahpur defeating their opponents, in Ghirshman, *op. cit.*, figs. 165, 166.

44. xvi. 9.

In the *Strategikon*⁴⁵ cavalry clearly took precedence over infantry. It was protected with an ankle-length coat (ζάβα/λωρίκιον)⁴⁶ for the main defence and a hood (σκάπλιον) pulled up over the head in battle but otherwise hung from the shoulders.⁴⁷ The helmet had a short plume and a chin-strap, and was worn with a circular gorget (περιτραχήλιον) to protect the throat, lined with wool or linen and with a fringe. It is stated to have been adopted from the Avars, and was used only by the cavalry.⁴⁸ Arm-guards (χειρομανικά) were worn by the élite unit, the *Boukellarioi*, and completing the defensive equipment was a small circular shield (σκουτάριον).⁴⁹

Weapons included the long cavalry sword (σπαθίον) and the lance, made of light wood, iron-headed. In the middle was a strap or thong (also an Avar feature) and a bannerole was fixed below the head.⁵⁰ The lance was carried on the back, presumably slung over and held by the strap; or carried in the right hand.⁵¹ In addition, a bow (τοξάριον) and forty-arrow quiver was slung from the saddle or waist-strap. The bow-case was of the Persian type,⁵² and a pouch with spare strings and

45. See above, n. 6. On the problem of the composition of the treatise, see the summary of Gy. Moravcsik, *Studia Bizantina* (Budapest, 1967), pp. 222–3; and Dain, ‘Stratégistes’, pp. 344ff.

46. *Strat.* i, 2. 2. These are ankle-length for the cavalry, but knee-length for the infantry. For the practicability of such long coats, see below, n. 126.

47. vii, 15. 2; x, 1. 4.

48. i, 2. 2.

49. i, 2. 3.

50. i, 2. 2. Aussaresses calculated the lance, from internal evidence, to be about 3.60 m. in length (op. cit., p. 51, n. 3).

51. i, 1. 5; xi, 2. 6.

52. There were two main types of bow-case, that in use with the Iranian peoples, the Chinese, and in Europe; and that used on the steppes by people of Turkic/Mongol stock. The first was a case proper, with a flap, slung from saddle or waist-belt. A number of Byzantine military handbooks refer to the *θηκάρια* carried by the imperial troops, e.g., Maurice, *Strat.*, ii, 1; i, 2. 2. See also Leo, *Tactica* (*Sylloge Tacticorum Graecorum*, III), ed. R. Vari; *Leonis Imperatoris Tactica*, I and II (Budapest, 1917) v, 3; vi, 2; and *Syll. Tact.* (*Sylloge Tacticorum quae olim ‘inedita Leonis tactica’ dicebatur*), ed. A. Dain (Paris, 1937), 39. 4. The nomad bow-case, on the other hand, was rather like a sword scabbard, and could be used only when the bow was unstrung (note Maurice, *Strat.*, xi, 2. 6; Leo, *Tact.*, xviii, 49). See Gy. Laszlo, ‘Contribution à l’archéologie de l’époque des migrations, ii: Le carquois d’arc des Hongrois conquérants’, *Acta Archaeologica Academiae Scientiarum Hungaricae*, VII (1957), 172ff. For illustrations, see the eighth-century A.D. Pendzhikent frescoes in Belenitsky, op.

other tools for maintaining the bow was also carried. Soldiers who were not skilled with the bow were to practise it constantly and carry a shield and lance as their chief weapons.⁵³ Completing the trooper's equipment was a large, thick felt cloak, resistant to both rain and arrows and so a defence in its own right.⁵⁴ Their remaining clothes were to be in the Avar style, loose fitting and gaily decorated, of linen for the summer and goatskin for the winter.⁵⁵

The horses of the cavalry were to be protected with iron or felt armour, or after the fashion of the Avars, that is to say, with lamellar armour or either metal or leather, for their heads, necks, and forequarters.⁵⁶

Finally, each soldier was equipped with two iron stirrups, unknown to Justinian's cavalry and an innovation which has been shown to be due to the Avars,⁵⁷ from whom a good deal of

cit., pl. 137, the first- or second-century A.D. rock drawing at Suljek in Siberia (Laufer, op. cit., fig. 35) and the ninth-century silver dish from Perm (Belenitsky, op. cit., pl. 74). There seems to have been only one basic type of quiver, an elongated trapezoidal case with a cover, shown on most of the illustrations depicting mounted soldiers referred to in this article. See Gy. Laszlo, 'Études archéologiques sur l'histoire de la société des Avars', *Archaeologia Hungarica* (hereafter *AH*), n.s. XXXIV (1955), 224-6, fig. 61; T. Horvath, 'Die avarischen Gräbenfelder von Ullö und Kiskövös', *AH*, XIX (1935), 33, pl. xxii, 7.

53. i, 2. 3; 2. 5. 54. i, 2. 9. 55. i, 2. 8.

56. The evidence suggests that the Avars were mainly responsible for the introduction of lamellar horse armour. In this context, the equestrian relief of Chosroes at Taq-i-Bostan is of some importance, since this is the only representation for this period of such armour for horses. Possibly it was modelled on Avar-Roman fashion passed on during Maurice's reign, perhaps through the guardsmen sent to Chosroes in 592. See Theophyl. Simocatta, *Historia* (*CSHB*), v, 3; 5; 11. At a later point in the treatise, Maurice refers to horse armour as being of either metal or felt (xi, 2. 7), a statement which is supported by the archaeological material. See Russell-Robinson, *Oriental Armour*, figs. 26, 27, 65, 81; and Ghirshman, *Iran; Parthians and Sassanians*, fig. 446.

57. On the arrival of stirrups in the west, see L. White, jnr., *Medieval Technology and Social Change* (Oxford, 1962), where their early appearance is denied; and the critique of this by P. Sawyer, in R. H. Hilton and P. Sawyer, 'Technical Determinism: the Stirrup and the Plough', *Past and Present*, XXIV (April 1963), esp. 90-5. For the latest survey of the evidence, see Bivar, op. cit., 286-7. Stirrups were certainly an improvement, but they were not vital for shock combat. Lack of stirrups meant that, in order to brace himself for the shock, the lancer had to bend forward and grasp his spear with both hands,

other equipment was also borrowed.⁵⁸ No mention is made of special equipment for light cavalry, and we must infer that, as in Justinian's army, the light troops were still provided by allies outside the Empire or from special groups within it. Heavy cavalry units were supposed to take turns as skirmishers.⁵⁹

The description of the infantry equipment differs little from that of the cavalry. They were divided into two groups, the heavy troops (σκουτάτοι) and the light troops (ψιλοί). The best of the former wore *zabai*, if these could be obtained, and a helmet, especially for those in the front ranks and on the flanks. The latter were also to be equipped with greaves (περικνημίδες) of iron or wood;⁶⁰ and all carried a spear, shield, and sword (σπαθίον έρουλίσκιον).⁶¹ The javelin might also be carried, along with the sling.⁶²

The equipment of the light troops comprised a bow, with bow-case and quiver slung from the shoulders; a small shield; light and heavy javelins; a sling; and a device for firing short, heavy bolts.⁶³ This is the full range of equipment available—the

thus reducing control over his mount. The majority of illustrations show riders without stirrups in this posture. See Aschik, 'Chambre sépulcrale', fig. v; Stephani, *Supplement*, pl. x; Laufer, *Chinese Clay Figures*, fig. 35; N. Mavrodinov, 'Le trésor protobulgare de Nagyszentmiklós', *AH*, XXIX (1943), 115; Ghirshman, *op. cit.*, figs. 69, 122, 166, 233; Schmidt, *Persepolis*, III, pls. 89, 91, 95. With stirrups the rider could engage more effectively in close combat, and at greater speed, without fear of losing his seat through sudden sideways movements. His ability to use a bow was neither improved nor impaired. See P. Vigneron, *Le Cheval dans l'Antiquité Gréco-Romaine (des Guerres Médiques aux Grandes Invasions). Contribution à l'Histoire des Techniques*, I (Nancy, 1968), pp. 255 f.

As a result of the use of stirrups, a new form of saddle appears to have been introduced, and it seems likely that the Byzantines adopted the Avar saddle along with the stirrup. See Gy. Laszlo, 'Der Grabfund von Koroncó und der altungarische Sattel', *AH*, XXVII (1943), 159–70, pls. xiii–xix; *idem*, 'Études archéologiques', 279–81, figs. 83–5. See Maurice, *Strat.*, i, 2. 7.

58. See, for example, *Strat.*, i, 2. 3; 2. 7; etc. 59. ii, 5. 5; iii, 5. 14.

60. See above, note 17; wood was clearly a practical form of defence.

61. The heavy infantry spear could be either the same type as that used by the cavalry or, for particular types of terrain, a shorter version. See *Strat.*, xii, 8. 20–1.

62. For this equipment, see *Strat.*, xii, 8. 4.

63. Σωληνάριον. Possibly the crossbow. See J. F. Haldon, 'Σωληνάριον: the Byzantine Crossbow?', *University of Birmingham Historical Journal*, XII, 2 (1971), 155–7. There are a number of problems surrounding this interpretation, however, and further research is needed before a satisfactory answer can be given.

author can hardly intend each man to carry all the weapons listed.⁶⁴

Maurice's account therefore gives a detailed picture of the arms of the Imperial troops at the end of the sixth century. He seems to mean mail rather than any other form of defence by the terms *zaba/lorikion*—both words clearly referring to the same piece of equipment which was supposed to be rolled up into a small bundle and be kept in a leather bag, something which only mail could be expected to do. The term *lorikion* nearly always refers to mail in the tenth-century treatises.⁶⁵

There is a move to increase the weight of arms carried in the *Strategikon*: the result of close and continuous contact with the Avars. The *Strategikon* should not be taken too literally, however, for the troops the author envisaged are clearly those of the Imperial field forces under the authority of the *magistri militum in praesenti*;⁶⁶ and he makes it quite clear that the equipment listed is only an ideal rarely achieved.⁶⁷ Mail was an expensive item and the majority of soldiers must have used the cheaper and more readily obtained lamellar or padding.

Corroborative evidence shows that the *Strategikon* gives a reliable account of the type of armour used. The most striking parallel is the high relief of Chosroes II at Taq-i-Bostan. His horse has a lamellar trapper and what appears to be a metal or leather headguard.⁶⁸ The rider wears a mail coat reaching the knees, a rounded helmet and an aventail of mail, leaving only the eyes uncovered (the Byzantine equivalent at this time was the hood, although the Persian fashion seems later to have been adopted). He carries a lance and shield; the quiver is slung from a waist-belt. A similar outfit can be seen on a post-Sassanian

64. xii, 8.5.

65. i, 2. 2; 2. 17. In the anonymous treatise, *zaba* is used in its strict sense, to mean a cloth or leather coat, worn when mail was not available. The use of the word in the later tenth century supports this (below, note 126). Maurice and other sixth- or seventh-century sources who equate it with *lorikion*, i.e. mail, are using it in a more general sense. The origins of the word are obscure. It appears, as far as I am aware, in only four other sixth- or seventh-century contexts: see *Chronicon Paschale* (*CShB*), p. 625 (A.D. 532) and p. 719 (A.D. 626); *Vie de Théodore de Sykéon* (ed. and trans. A.-J. Festugière, Bruxelles, 1970), 28, 3; Justinian, *Nov.* 85, 4 (edd. Schoell and Kroll).

66. i, 2. 3; ii, 5. 3–5, where a number of field-army units are referred to.

67. E.g. i, 2. 6; xii, 8. 4.

68. Iron head-pieces are specified at *Strat.*, i, 2. 6.

silver dish of the eighth or ninth century from Perm, where mounted warriors wear a variety of weapons and armour—long lamellar coats reaching the ankles, and helmets with mail or lamellar neck-guards. Two seem to have mail shirts beneath the lamellar, while another has lamellar armour for his mount.⁶⁹ Some frescoes from the sixth to eighth-century site at Varakhshah near Bokhara (now in the Kyzil-Kum desert) depict warriors in similar panoply.⁷⁰ The affinity with Avar armour is confirmed by other discoveries. Quantities of leather *lamellae* have been found in Avar graves,⁷¹ while the gorget protecting the neck is very similar to one depicted on an Avar grave-figure from Kertch, which has a strip of lamellar running around the neck beneath the chin.⁷² Even the strap attached to the lance is illustrated on nomad rock-reliefs, such as at Suljek in Siberia.⁷³ The leg- and arm-guards mentioned by the *Strategikon* were very probably of splint construction, similar to sections of such armour discovered in other Avar graves at Kertch.⁷⁴

Lamellar armour was certainly familiar to the Sassanians, as a sixth-century silver dish illustrates;⁷⁵ which suggests that the Byzantine *zaba/lorikion* may have been similarly constructed, although mail was clearly regarded as the norm.

There are no contemporary illustrations of the infantry armour, but third-century frescoes in the synagogue at Dura Europos show soldiers armed with the *Strategikon*'s long-sleeved, knee-length mail coats, holding swords or spears; illustrations which seem to have been inspired by the equipment of Roman heavy infantry of the period.⁷⁶ The essential features of infantry equipment have therefore changed very little, if Maurice's description is to be trusted.

There are no detailed accounts of military equipment for the central period. The general impression is that the weight of arms

69. See Belenitsky, *Central Asia*, pl. 74.

70. Belenitsky, *op. cit.*, p. 144.

71. Thordemann, 'Splint Armour', 126–7.

72. Arendt, 'Waffenfund', fig. 7.

73. Above, n. 12.

74. See Arendt, *op. cit.*, figs. 1b, 3b; and A. Stein, *Serindia: Report of Explorations in Central Asia and Westernmost China* (Oxford, 1921), V, pls. lxxii, lxxxiii.

75. Le Coq, *Bilderatlas*, fig. 74.

76. See the Dura Europos *Final Report*, VIII, i, pls. liv, lv.

decreased as a result of the localization of military forces, which were equipped according to the availability of the necessary raw materials (iron, wood, leather, horn, etc.) and according to local tradition. During Heraclius' reign, and probably until the 660s, the political and military situation was never such as to deny earlier sources of material permanently or to destroy effectively the old military organization, although it is clear that it was substantially modified as a result of the Arab attacks in the 650s and after; the account of the *Strategikon* is probably applicable to this period also. But after regular Arab raids into Anatolia began, effective central control of supplies and of the various army corps must have become difficult, if not impossible. Warfare now demanded lightly-armed horsemen to chase or hold small raiding-parties, and infantry forces to maintain fortlets and fortresses. Only rarely were offensive campaigns fought, and these usually involved troops based under the Emperor's own command near the capital—forces which may well have retained the heavier armour described by Maurice.⁷⁷

Pictorial evidence is meagre. The few examples include a ninth-century ivory⁷⁸ showing a mounted soldier with a sleeveless mail shirt, helmet, and bow.⁷⁹ Further evidence is provided by three ninth- or tenth-century illuminated manuscripts,⁸⁰ where the most heavily armed soldiers wear either mail or lamellar coats, sometimes waist-length, sometimes knee-length. Helmets are worn, either with mail hoods (as described in the *Strategikon*) or with pendant neck-guards of mail, lamellar or leather. Spears and swords are the usual weapons. As described in later treatises, the sword is usually slung from a

77. For general references to the armour of soldiers in the eighth and early ninth centuries, see for example Theophanes, *Chronographia* (de Boor), p. 387, 15; *Scriptor Incertus de Leone Bardae Filio* (in *Leo Gram.* (CSHB), pp. 335–62), p. 339, 7–8. Theme soldiers were expected to have only the minimum. Cf. *Ecloga* (in *Zepos, JGR*, II), xvi, 2.

78. This ivory is now in the Louvre. See Lefèvre de Noëttes, *L'Attalage: le cheval de selle à travers les âges* (Paris, 1931), fig. 346.

79. Several other ivories which Lefèvre de Noëttes dated to the seventh or eighth century are later in date. See A. Goldschmidt and K. Weitzmann, *Die Byzantinischen Elfenbeinskulpturen des X–XIII. Jahrhunderts*, I: Kästen (Berlin, 1930), no. 32. Cf. Lefèvre de Noëttes, op. cit., figs. 280, 344.

80. Despite the archaising tendencies of MS. illuminations or ivories, a few details of contemporary significance are often included.

shoulder-strap or baldric, hanging from the left side. Frequently an outer defence is worn: a short-sleeved, waist-length cuirass of lamellar.⁸¹

This cuirass, or *κλιβάνιον*, is the only new piece of equipment to appear in these illustrations. When it was introduced is not certain, although Sassanian reliefs show that a similar outer defence was worn as early as the fourth century.⁸² It is referred to in accounts of some mid-ninth-century ceremonies, and perhaps developed as an additional, more rigid defence worn on top of the mail coat, during the seventh and eighth centuries,⁸³ or as a light, easily constructed armour for the trunk, worn by itself. It would have been of great value to the light cavalrymen of the Theme armies.⁸⁴

Non-Byzantine material for the period shows that while the use of lamellar spread, the only real changes occurred in local fashion. The Arabs adopted the panoply they found in Persia and eastern Anatolia, although, as in contemporary Byzantium, heavily armed cavalrymen seem to be a rarity. There are few changes in central Asia and on the steppes, although the former area, under the influence of Chinese culture, developed a particular style of armour, that later influenced Persia and the Arab world very strongly. The predominance of lamellar, and lamellar combined with mail, can be seen in a number of examples of central Asian or nomadic art dating from the seventh to the ninth centuries. The remains of a painted shield from the castle of Mug at Pendzhikent in Sogdiana (Tadjikistan), destroyed in the mid-eighth century, has traces of a picture showing a warrior on horseback, who wears a long coat of lamellar, with splint arm-guards. He carries a bow.⁸⁵ His equipment is similar to that which appears on a wall-painting at Kizil, on the western borders of China, where a distinguished Perso-Buddhist culture had one of its centres from the fifth to

81. In S. Dufrenne, *L'illustration des psautiers grecs du moyen âge* (Paris, 1966). From the Bristol psalter folios 10r, 86r, 89r, 93r, 180v, 231v; from the Paris psalter (MS. grec 20, Bibliothèque Nationale), folios 17v, 18r; from the Mt. Athos psalter (MS. Pantocrator 61, Bibl. Nat.), folios 11v, 30v, 68v, 89r, 109r, 196r, 197v.

82. Cf. the Firuzabad reliefs referred to above, n. 43.

83. See *De Cerimoniis* (CSHB), pp. 500, 5–12; 505, 14–18; 506, 12; 14–15.

84. For illustrations, see nn. 80, 81.

85. Belenitsky, *Central Asia*, pl. 110.

the eighth centuries. In this eighth-century fresco, mounted warriors are depicted wearing a similar form of 'banded' lamellar, constructed probably from hide or boiled leather and decorated in various colours.⁸⁶ They also wear arm-guards, and the upper part of the armour of two of the warriors has mail and decorated plates of armour attached.⁸⁷ Finally, the Kizil frescoes illustrate quite clearly the 'breeches' of lamellar (later of mail also) which developed in central Asia and on the steppes as an alternative to the long skirt or coat, and were later passed on to the west, through the Magyars.⁸⁸ A northern Persian silver dish of the eighth century illustrates a local or Turkic horseman of the period wearing a knee-length lamellar coat without sleeves over a short-sleeved mail shirt. His conical helmet has a mail aventail attached.⁸⁹ Warriors with similar armour can be seen on the Nagszentmiklós jug in Hungary. The mounted chieftain in one panel wears a mail shirt with attached breeches to the knees, and with sleeves of mail to just below the elbows. The lower arm and lower leg are protected with long splints linked by mail, an improvement on simple splint defences and part of the development in favour of composite armour. He wears a

86. This banded armour seems to be a form of lamellar in which the rows of lamellae are lacquered in different colours. For further examples see Stein, *op. cit.*, V, pl. lxxiii, a Buddhist painting on silk of the ninth or tenth century from Tun Huang, Turkestan; note that in this painting, ordinary lamellar is shown quite clearly on other figures.

87. See Le Coq, *op. cit.*, figs. 32, 33. The tubular lower arm-guards worn by one of the Kizil figures and shown on the Mug shield are the earliest examples of a fashion which was later to become general in Persia and the Middle East. See Russell-Robinson, *Oriental Armour*, pp. 26, 28ff.; Stone, *Glossary*, pp. 107–9, fig. 140. Cf. other frescoes from Pendjikent dating to the eighth century, showing nobles with tubular or mail arm- and wrist-guards. Some also seem to have mail shoulder-guards. See Belenitsky, *Central Asia*, pl. 137. Combination armours became a feature of Persian and middle-eastern armour, and were also common in China. See Laufer, *Chinese Clay Figures*, pp. 275ff. For the early stages of this development, see Stein, *op. cit.*, V, pls. lxiii, lxxxiv, lxxxvii/006, xc, xcii/0026, etc. For Iranian and later Turkish examples, see Russell-Robinson, *op. cit.*, pp. 33ff. The origins of the style lie in the wearing of a separate jacket of leather or a cuirass of lamellar above the mail shirt, a tradition which prevailed in Byzantium as the *klibanon*.

88. See the soldiers on the Nagszentmiklós jug, in N. Mavrodinov, 'Le trésor protobulgare de Nagszentmiklós', *AH*, XXIX (1943), 120–1, fig. 77.

89. See Ghirshman, *Iran: Parthians and Sassanians*, fig. 433; Belenitsky, *op. cit.*, pl. 137.

conical helm with a hood,⁹⁰ and carries a spear. In all essentials save the hood he is the same as the Avar horsemen described by Maurice. His defeated opponent wears a similar outfit, although this is apparently of lamellar. The prince recurs on the opposite side of the jug, in a lamellar outfit with breeches. The outfit is remarkably similar to that worn by warriors depicted in the second-century B.C. Pantikapaion fresco at Kertch.⁹¹

It should now be clear that Byzantine arms formed only a part of a much wider cultural world. From A.D. 650–850 Byzantium was isolated, but few new developments took place beyond the empire and they were at first of local importance only: the beginnings of composite defences (especially the use of extra sections of armour worn over the basic outfit); and the use of splints or lamellae with mail. I have paid less attention to western and northern Europe for two reasons. Firstly, the Byzantines seem to have influenced the west rather than vice versa, until the late eleventh and twelfth centuries, when the influence of the Normans and later the crusading armies wrought a number of changes; and secondly, because western types of armour made no appreciable advances from late Roman times in the basic outfit: mail shirt, segmented helmets, sometimes with face-guards, more often without; leather or padded jerkins and splint or mail arm- and leg-defences. Only the adoption of the stirrup during the late seventh and early eighth centuries and of the breeches of mail from the Magyars during the late ninth century were new. The appearance of large groups of mail-clad, lance-wielding cavalry affected Byzantium only to the extent that the imperial armies increased the numbers of their own such soldiers during the tenth century, notably during the reign of Nikephoros Phokas (963–9). The development of a specifically western type of armour, the segmented plate armours of the thirteenth century and after, was the direct result of contacts with the middle east and Byzantium and the need to find a more effective defence against the

90. This may be the result of Byzantine influence; for whereas the pendant aventail, attached to the helmet, seems to be an eastern (Persian) development, the hood seems to be a western (Byzantine) feature, passed on to the peoples of western Europe.

91. See Mavrodinov, 'Le trésor protobulgare', pls. iii, iv; and Aschik, 'Chambre sépulcrale', pl. iv.

crossbow. From the point of view of military technology, the west seems to have remained relatively backward until the eleventh century, contributing little to developments further east. Only the kite-shaped shield, described in Byzantine treatises of the tenth century, seems to have been of western origin, and that is by no means certain.⁹²

By the middle of the ninth century, therefore, Byzantine arms and armour had seen few innovations. The tenth-century military manuals describe the armour in greater detail than ever. Terminology has altered, but basic types of armour remain unchanged. The *klibanion* and sabre were introduced perhaps in the eighth or ninth century, but the most striking change was the new emphasis on heavy troops and the revival of interest in military science.

The tenth century

For this period there are a number of military manuals dealing with strategy and tactics in general, or with siege warfare, skirmishing warfare, and other specialized topics. Of these, four give fairly detailed descriptions of soldiers' equipment: the *Tactica* of the Emperor Leo VI; the *Problemata* attributed to the same; the anonymous *Sylloge Tacticorum*; and the *Praecepta* of the Emperor Nikephoros.⁹³

The sections on arms and equipment in Leo's *Tactica* begin with a general list of items required by the cavalry, infantry, and the supply train. This includes bows and their cases, quivers with

92. For descriptions of the arms and equipment of western armies, see Maurice, *Strat.*, xi, 3, especially para. 3. 2. The same passage, with additions, is quoted by Leo in *Tact.*, xviii, 80f. For further comment, see Oman, *The Art of War*, I, pp. 76ff.; 126ff.; II, pp. 3–5; Lot, *L'Art militaire*, I, 103ff.; J. Hewitt, *Ancient Armour and Weapons in Europe* (London, 1855), I, pp. 93ff.; 129ff.; R. C. Smail, *Crusading Warfare (1097–1193)* (Cambridge, 1956), pp. 112ff. See also a number of MS. illuminations illustrated in R. Barber, *The Knight and Chivalry* (London, 1970), figs. 1, 2, 8. For the kite-shaped shield, see Hewitt, *op. cit.*, pp. 143ff. For examples of the heaviest armour worn by western soldiers in the eleventh century, see the Bayeux tapestry.

93. *Leonis VI Sapientis Problemata*, ed. A. Dain (Paris, 1935); *Nicephori Praecepta Militaria*, ed. J. Kulakovskij, in *Zapiski Imperatorskoj Akademii Nauk*, VIII ser. (classe phil.-hist.), VIII (1908), 9. There are also a number of lists of military equipment in *De. Cer.*, pp. 669ff. These include some of the items referred to below, but generally deal with more specialized weapons which I do not discuss here, such as boarding pikes.

arrows, spears 12' in length, javelins, a variety of axes, and swords.

The latter were divided into two main groups. The ordinary sword appears under the name *σπαθίον*, and was apparently four spans long, at least (36"), including the hilt, but might be slightly longer. It was straight and two-edged.⁹⁴ A second type appears in the late ninth century, called in Leo and other sources a *παράμηριον*. It was about the same length as the *spathion* but was single-edged.⁹⁵ The main difference between the two weapons seems to have lain in the way they were carried. The *spathion* was usually worn hanging from a baldric which passed over the shoulder 'in the Roman fashion',⁹⁶ whereas the *paramerion*, as its name suggests, was worn from a waist-belt and hung next to the thigh.⁹⁷ It is uncertain whether the phrase *σπαθίον ζωστήκιον* refers to the *paramerion*, or to an ordinary sword worn from a waist-belt. Probably it is a paraphrase of the term *paramerion*.⁹⁸ The sources do not state whether the blade of the *paramerion* was curved or its hilt angled, but judging from the description, it seems to be the sabre, also carried on a waist-belt, introduced first by the Avars, but not adopted by the Byzantines until much later. Even in the tenth century it remained a secondary weapon—soldiers also carried an ordinary sword.⁹⁹

94. *Syll. Tact.*, 39, 2.

95. *Ibid.*, loc. cit.

96. *Leo, Tact.*, vi, 2; *Syll. Tact.*, loc. cit.

97. *Leo, Tact.*, vi, 2; *Syll. Tact.*, 38, 5; 39, 2.

98. See *De Cer.*, pp. 500, 8; 505, 11, 16–17; and Niceph., *Praecepta*, pp. 1. 24; 2. 11; 11. 32.

99. See Niceph., *Praecepta*, p. 11. 33; p. 12. 11; and the previous references to Leo and the *Syll. Tact.* The origins of the sabre in Byzantium are obscure, but we must in all probability attribute it to the appearance of Chazar and other Turkic soldiers in the imperial service during the second half of the ninth century. See *Genesisius (CSHB)*, p. 89, 9; *Vita S. Euthymii* (ed. P. Karlin-Hayter, *B*, xxv–xxvii (1955–7), pp. 8–152), p. 10; *Theoph. cont. (CSHB)*, p. 358; *Georg. Mon. cont. (CSHB)*, p. 853; *Leo Gram. (CSHB)*, p. 267. On the long Avar sabre, see N. Fettich, 'Das Kunstgewerbe der Avarenzeit in Ungarn', *AH*, I (1926), 14, fig. 12; A. Marosi, N. Fettich, 'Trouvailles avares de Dunapentele', *AH*, XVIII (1936), 11, pl. i; 49, 55–6; Gy. Laszlo, 'Études archéologiques', 228–9, 232–3, pls. xlv, li–liii. From the later seventh century the shorter curved Turkish sabre developed. See A. Zakharov, W. Arendt, 'Studia Levedica', *AH*, XVI (1935), pt. 2: 'Turkische Säbel aus den viii–ix Jahrhunderten', and pls. iii, vi, viii; N. Fettich, 'Die Metallkunst der landnehmenden Ungarn', *AH*, XXI (1936), pls. xv, xxxi, xli/2, lxxii, xci/55; L. Kiss, 'Der altungarische Grabfund von

The axes were grouped into four classes: a single blade;¹⁰⁰ a blade on one side and a spike on the other;¹⁰¹ rounded and straight blades and twin rounded blades.¹⁰²

Three main types of spear can be distinguished. Firstly, the lance or spear used by heavy cavalry and infantry, generally referred to as a *κοντάριον*,¹⁰³ but sometimes as a *δόρυ*.¹⁰⁴ The length varied, but was usually about 12' long for the cavalry and 14' for the infantry, with a head of 9" or more.¹⁰⁵ The second type were light throwing spears, referred to as *ῥιπτάρια/ἀκόντια*, 8' long and not more than 9' with the head.¹⁰⁶ Leo also includes the *βερύττα* in this group, although the evidence from other texts suggests that it should be in the following group.¹⁰⁷

This comprises the heavy javelins. Three terms are used: *berytta* (Lat. *verutum*); *μαρζουβάρβουλον* (Lat. *martio-barbulus*); and *μεναύλιον* (Lat. *venabulum*), although only the latter seems to have a strict meaning. The *verutum* of Vegetius' day was a short javelin used by the heavy infantry,¹⁰⁸ in the same way as the

Geszteréd', *AH*, XXIV (1938), pls. x, xi. For the waist-harness, see Gy. Laszló, 'Etudes archéologiques', figs. 47, 60, 61, 64, 79, 80, 83. Cf. the Perm plate and the Pendjikhent frescoes in Belenitsky, *Central Asia*, figs. 74, 137. For the two-edged sword see A. Bruhn-Hoffmeyer, *Middelalderens Tvaeggede Svaerd* (Copenhagen, 1954), I, pp. 200-4. He wrongly considers the *spathion* to have been a short sword. Although longer swords were known to the Byzantines, used by the 'Franks' (see Leo, *Tact.*, xviii, 82), the *gladius* or short thrusting sword adopted by the Romans from the Iberian Celts had been abandoned by the end of the third century A.D. Vegetius describes two types known to him: the *gladius major* or *spatha* (the *spathion herouliskion* of Maurice, *Strat.*, xii, 8. 4), and the *gladius minor* or *semispatha* (*Veg.*, ii, 15). The latter does not appear in any of the later sources that I have examined, but see Justinian, *Nov.* 85, 4—σπάθας τε καὶ ζῖψην (ἀπερ καλεῖν ἐτώθασιν παραμήρηια). Kulakovskij considered that the sabre may have been introduced at a much earlier date, but the evidence he cites does not warrant this conclusion. See Niceph., *Praecepta*, pp. 42-4.

100. *Tact.*, v, 2. 101. *Tact.*, v, 2; vi, 1. 102. *Tact.*, vi, 25.

103. E.g. *Strat.*, i, 1. 5; i, 2. 2; xi, 2. 6; xii, 8. 4; etc.; Leo, *Tact.*, v, 2; vi, 2; 3; etc. 104. *Syll. Tact.*, 38, 3; 6; 39, 1; 8.

105. Leo, *Tact.*, v, 2; vi, 2; *Syll. Tact.*, 38, 3; 39, 1; 8.

106. *Syll. Tact.*, 38, 6; 39, 8; Leo, *Tact.*, vi, 7; *Problemata*, xi, 35; 40; *De Cer.*, 669, 20.

107. Leo, *Tact.*, vi, 26.

108. *Veg.*, II, 15: 'hasili pedum trium semis, quod tunc vericulum, nunc verutum dicitur'.

martiobarbulus, which it resembled in size;¹⁰⁹ *οπιλετηε* *venabulum* was a heavy hunting spear or javelin. The three words are used indiscriminately by Leo for the same weapon, whereas in the more reliable *Sylloge* and *Praecepta* only *menaulion* occurs, as a heavy javelin or spear used by a proportion of each infantry unit.¹¹⁰ Leo repeats most of the statements made in the *Strategikon* about the *marzubarboulon*. It is possible that the weapon was still a distinct type of javelin, although the evidence for this is dubious. The word *menaulion*, however, retained a practical meaning—a specific type of spear. In the *Praecepta*, for example, frequent reference is made to the *μοναυλάτοι*, the men who were equipped with this weapon.¹¹¹

Different types of shield were provided for different tasks. Leo describes three: large, circular shields (*θυρεοί*); smaller, circular shields; and burnished, circular iron ones.¹¹² The *Sylloge* and the *Praecepta* go into more detail, giving the dimensions of the shields carried by both infantry and cavalry. Infantry shields

109. The *mattiobarbulus* was a lead-weighted javelin. See *Veg.*, i, 17: 'Plumbatarum quoque exercitatio, quos mattiobarbulos vocant'; iii, 14: 'Quartus idem ordo construitur de his, qui alacriter verutis vel mattiobarbulis, quas plumbatas nominant, dimicant'. See ii, 15, for these weapons in action.

110. See John Malalas (*CSHB*), p. 163, 3; Leo, *Tact.*, vi, 26; 32; *Problem.*, xii, 4–5; 7; 21; 40 (*verutum*); *Tact.*, vii, 3; *Problem.*, xii, 4–6; 21 (*matzubarboulon*); Dain, *Naumachica* (Paris, 1948), i, 14–16; 70 (excerpts from Leo's naval section); *Syll. Tact.*, 38, 3; 47, 16; 22–4; Niceph., *Praecepta*, p. 3, 15f.; p. 4, 11f. (*menaulion*). The latter were to be made of cornel wood, mature oak, or 'artzikidion', rather than wood which splinters easily. See *Syll. Tact.*, 38, 3; Niceph., *Praecepta*, p. 4, 11f. Cf. also *De Cer.*, 669, 20; *Theoph.* (de Boor), 221, 3; *De Administrando Imperio* [DAI] (Jenkins/Moravcsik), I, 116, 9.

111. Niceph., *Praecepta*, p. 3, 15f.; 26f. There seems no reason to doubt that Leo is copying Maurice where the *marzubarboulon* is concerned. Cf. Maurice, *Strat.*, xii, 8, 2; 4; 5; Leo, *Tact.*, vii, 3; *Problem.*, xii, 6; 7. It was certainly a javelin and not, as Aussaresses considered, a mace: op. cit., p. 53. He presumably based his translation on the fact that where Maurice has *marzubarboulon* listed among the extra material carried with each unit, Leo writes of axes (*tzikouria*) and maces (*bardoukia*, *matzoukia*). See *Strat.*, xii, 8, 6; *Tact.*, vi, 27). Even so, it is quite clear from other contexts that the weapon was not a mace. See, for example, *Strat.*, xii, 8, 2 (*Tact.*, vii, 3); xii, 8, 4 (*Problem.*, xii, 6); xii, 8, 5 (*Problem.*, xii, 7). An additional confusing factor is that *marzubarbouloula* are kept in leather cases in the same way as maces: see *Strat.*, xii, 8, 5; *Tact.*, vi, 11; 26; etc. This seems in fact to be a reference to a leather sheath or case in which a group of javelins were held, in much the same way as the heavy javelins of Vegetius's time were kept in the hollow of the shield. See *Veg.*, i, 17.

112. *Tact.*, v, 2; vi, 25–6; xix, 57 (*Naumachica*, I, 65).

could be three- or four-cornered, tapering at the bottom and about 54" long (i.e. kite-shaped); or circular, with a diameter of about 30".¹¹³ Cavalry shields are smaller. They can be oblong, with a length of either 36" or 40"; or circular, with a diameter of 27", the former mainly for the heavier cavalry, the latter for the mounted javelinmen or archers.¹¹⁴

Leo is less precise about defensive equipment than the later treatises, but accurate. He adds to the description of the *lorikion/zaba* taken from Maurice that if this item cannot be procured in mail, it should be constructed of boiled leather or horn, in other words of lamellar construction. He also lists *ἐπιλωρίκια* and iron or horn *klibanía*, arm- and leg-defences, helmets, aventails and gorgets, felt corselets and cloaks, and horse armour of iron or felt.¹¹⁵ The terms *zaba* and *lorikion* in Leo are synonymous, and mean either a long mail coat or a long lamellar coat,¹¹⁶ as in Maurice's time. The *epilorikion* is a long surcoat, and from later sources we learn that it was a padded coat strong enough to act as a defence by itself. The *klibanion* is a short cuirass of lamellar construction, of iron or leather. The felt corselet he describes, later called a *καβάδιον*, is similar to the *epilorikion*.

Later sources say more about these armours. In the *Sylloge*, the word *lorikion* refers to a mail coat only, or simply to the mail itself.¹¹⁷ The *klibanion* was a short-sleeved jacket of lamellar, but the term was also used of lamellar armours in general. It is

113. *Syll. Tact.*, 38, 1; Niceph., *Praecepta*, p. 2. 3–4; 10.

114. *Syll. Tact.*, 39, 1; 8; Niceph., *Praecepta*, p. 13. 24–6. Another word which appears for shield is *δόρκα* (*De Cer.*, pp. 579, 2; 5; 670, 7; *DAI*, I, 26, 31; 51, 82–4), used of the shields carried by sailors and marines, made of hide. See Reiske in *De Cer.*, II, p. 682. *σκουτάρια Λυδιατικά* would appear to be the same as *dorkai* (*De Cer.*, p. 669, 19); while *σκουτάρια ῥαπτά* are hide/wood shields with metal plates stitched on, the polished circular iron shields of Leo, *Tact.*, v, 3. See *De Cer.*, p. 669, 19; *DAI*, II, p. 201.

115. Leo, *Tact.*, v, 3.

116. *Tact.*, v, 3; vi, 2.

117. The *lorikion* reaches to the knees for the infantry (*Syll. Tact.*, 38, 4) and to the ankles for the cavalry (*Tact.*, vi, 2; *Syll. Tact.*, 39, 1). For *λωρίκια κοινά* and *λωρίκια φιλά* see *De Cer.*, pp. 669, 16–17; 670, 9–10. For the term *lorikion* as equivalent to mail, see *Syll. Tact.*, 38, 7; 39, 1; 6; Niceph., *Praecepta*, p. 12. 31–2. The term *lorica* meant a mail shirt in the west also. The assize of arms of Henry II in 1181 orders that knights should be equipped with *loricas*, *casidas*, and carry *clypeos*. See W. Stubbs, *Select Charters* (Oxford, 1870–1960), p. 183.

described as usually made of iron, but also of horn or boiled hide.¹¹⁸ That it was not made of mail or quilting is quite clear, and its lamellar construction is made certain from the descriptions we have.¹¹⁹ In the naval section of Leo's *Tactica*, for example, *klibanía* are referred to as having lamellae (*petala*) in front, although not always at the back.¹²⁰ Pictorial evidence shows the form the *klibanion* took, for in several examples the scales are shown overlapping upwards, a significant feature of lamellar construction. The most striking examples occur on a tenth-century ivory casket from the Cathedral of Troyes, where four imperial figures, mounted, are shown wearing sleeveless, waist-length *klibanía*.¹²¹ Similar cuirasses, made of smaller or larger lamellae, can be seen in the Menologion of the Emperor Basil II, notably in the illustrations of himself and of Goliath; and on the reliefs at Aght'amar, again on the figure of Goliath. A large number of provincial frescoes, dating to the eleventh century and after, also provide good illustrations.¹²²

118. *Tact.*, v, 3; vi, 4; *Syll. Tact.*, 38, 4; 7; 39, 1.

119. See *Syll. Tact.*, 30, 2; 31, 1; *Tact.*, vi, 30; 34, where both authors paraphrase the treatises of Aelian and Arrian, but interpret their sources by making additions to the text, such as the *klibanion*, which they describe as of either iron or horn, ἐπιπλεγμένον. Cf. Aelian, *Takt. Theor.*, II, 7; 11 (in Köchly and Rüstow, op. cit., II, 1, pp. 236–469); Arrian, *Tactica*, 3, 2; 4, 1 (in *Arriani Nicomediensis Scripta Minora*, ed. R. Hercher [Leipzig, 1885], pp. 104–39). In the *Sylloge* (39, 6), horse armour is constructed either of *lorikia*, or of *klibanía* of iron or horn, συμπεπλεγμένοις. See also Niceph., *Præcepta*, p. 11. 20f. The word derives from the Latin *clibanarius*, itself of Persian origin, and refers to heavy cavalry armour. See Bivar, op. cit., 277, n. 28. Reiske, basing his argument on a false etymology supplied by John Lydus, suggested that it came from *chalybinon*, i.e. steel. See *De Cer.*, II, p. 583; J. Lydus, *De Mag.* (CSHB), p. 158.

120. Dain, *Naumachica*, I, 14.

121. In Goldschmidt and Weitzmann, op. cit., no. 122; for other tenth-century examples, *ibid.*, nos. 1a, 4, 8d, 10a–d, 11, 12a–b.

122. Ch. Diehl, *Peinture Byzantine* (Paris, 1933), pl. lxxxiii; S. Der Nersessian, *Aght'amar, Church of the Holy Cross* (Cambridge, Mass., 1965), pls. 23, 27; for the frescoes, see Restlé, *Byzantine Wall Paintings in Asia Minor* (1967), pls. 21, 28, 31 (late eleventh century); 183 (c. 1190–1200); 230, 237 (c. 1200–10); 246, 247 (c. 1070); 288 (c. 1040–50). A strikingly similar armour can be seen in Buddhist paintings of the ninth or tenth century at Tun-Huang in Chinese Turkestan. See Stein, op. cit., V, pl. lxxxiii; the beast-headed demon carrying the banner of the Vaisravana wears a lamellar coat constructed very similarly to that shown on Goliath at Aght'amar. Members of the imperial household had gold armour. See *De Cer.*, pp. 500, 5–12; 505, 14–18; 506, 12; 14–15.m Other *klibanía* were divided into 'ordinary' and 'better', see *DAI*, 51, 83–4.

The *epilorikion* and the *kabadion* are both defences constructed from doubled felt or quilting, with or without hoods. The first term, *epilorikion*, is more explicit, referring to a hooded garment, thickly quilted, reaching below the knees and worn by the cavalry either by itself or, more usually, over the *klibanion*.¹²³ The second term, *kabadion*, refers either to a knee-length tunic the same as the *epilorikion*, worn by the infantry; or to long sections of such quilting, hung by light horsemen from the waist to protect both themselves and, in part, their mounts.¹²⁴ Both types of tunic had wide, thick sleeves, tied back to the shoulders by strong laces.

No mention is made in the *Sylloge* or in the *Praecepta* of the long coat of lamellar (the alternative to the mail *lorikion*) referred to by Leo. This is something which Leo has retained from earlier sources; by his time only the *klibanion* was constructed of lamellar. Long coats of lamellar were known in Maurice's time and after, and were in continuous use in the steppes and in central Asia. It is possible, perhaps more likely, that some of the Chazar or Turkic mercenaries serving in the *Hetaireia* brought such equipment with them, and whose garb Leo noted in his *Tactica*. This type of armour was not used by the Byzantines on a large scale, however, and does not receive a mention in the other treatises.¹²⁵

In addition to their basic armour—the *lorikion* was worn with a *klibanion* or an *epilorikion*; or the *klibanion* was worn by itself,

123. Leo, *Tact.*, v, 3; *Syll. Tact.*, 39, 1; Niceph., *Praecepta.*, p. 11. 10f.; *De Cer.*, p. 670, 3.

124. Leo, *Tact.*, v, 3; xix, 3; *Syll. Tact.*, 38, 4; 7; Niceph., *Praecepta.*, p. 1. 16–17; p. 12, 5f. Cf. *De Cer.*, pp. 749, 772. Both versions of the padded coat were popular in the east. It is quite likely that the idea was adopted as a result of Arab or Persian influence in the first place. It was passed on in the twelfth century to the west under the name of wambais or gambeson. Saladin is reported to have given such a garment to Richard I: 'unum alcottonem (Fr. hacqueton; Arab. al-qutun, cotton) satis levem, nullo spiculo penetrabilem' (Oman, op. cit., II, pp. 3f.) See also *Chronicon Colmariense* (in *Monumenta Germaniae Historica*, XVII, ed. Pertz [Hanover, 1861]), s.a. 1298, p. 264.

125. Although soldiers wearing knee-length, long-sleeved coats of lamellar are illustrated in an eleventh-century MS. See Diehl, *Peinture Byzantine*, pl. lxxxii. Cf. Stein, *Serindia*, V, pls. lxxv/004; c; and a stucco figure from a Buddhist shrine at Kara Shahr (Chinese Turkestan) dated c. 750–850, *ibid.*, pl. cxxv. Compare also Aschik, *Chambre Sépulcrale*, pl. iv.

beneath the *epilorikion*—the soldiers might also wear arm- and leg-defences. There seems to have been considerable variety in the form these took. Leo states that they were of iron or wood, and the *Sylloge* adds hide, suggesting that they were either of splinted construction, or of padding, rather like modern football pads. In the *Praecepta*, the *klibania* of the heavy cavalry have sleeves attached, made of cotton and woven as thickly as possible; while the boots of the infantry are described as being of doubled material, reaching to the knees or higher, similar to the boots Basil II wears in his *Menologion*. Arm- and leg-guards were separate from the main defences and were apparently issued in pairs.¹²⁶ The general impression is that the infantry wore high, thick boots or splinted leg-defences and splinted arm-guards, where possible; and that the cavalry wore splinted arm-guards and/or quilted sleeves to the wrist, and splint leg-defences.

Helmets were another important feature of a soldier's equipment, and again there were several types. For the heavier and best-armed troops helmets with mail aventails were recommended, or with leather or cotton aventails, leaving only

¹²⁶ See Leo, *Tact.*, vi, 25; *Syll. Tact.*, 39, 2; Niceph., *Praecepta*, p. 1. 20f.; p. 11. 7f.; *De Cer.*, pp. 669, 18; 672, 5–6; 674, 5. For splint arm-guards, see G. Arwidsson, 'Armour of the Vendel Period', figs. 8, 12; and the Nagyszentmiklós figures. Those made of iron may have been of the tubular type referred to above (n. 87) which developed in Persia and central Asia from the seventh and eighth centuries. Leo and the *Sylloge* use the term *χαλκότουβα* for leg-defences, which suggests that these also were of metal splints, although the word is a classical term for moulded greaves: *Tact.*, vi, 25; *Syll. Tact.*, 38, 5. For lamellar arm-defences in the steppe areas, see Arendt, op. cit., figs. 1b, 3b; Stein, op. cit., V, pls. lxxii, lxxxiii, lxxxiv, lxxxv, lxxxvii/005. The upper sleeves attached to *klibania* appear to be of lengthened lamellae or splints, fixed to the main cuirass by thongs or a common backing—see Diehl, *Peinture Byzantine*, pl. lxxxiii. In the *Praecepta* the author states that the padded hangings attached to the *klibania* and the sleeves should have *zabai* affixed. Here the word no longer means a coat of armour, but the material itself—the face-guards of cloth attached to the helmets are also referred to as *zabai*—and is used in what would appear to be its original sense. In the sixth-century anonymous treatise, *zaba* is distinguished as a padded cloth coat; although in the treatises of Maurice and Leo and in other sixth-century references, it is used as a general term or the equivalent of *lorikion*. Cf. Niceph., *Praecepta*, p. 11. 13f.; anon., *Περὶ Στρατηγικῆς*, xvi, 9; *Vie de Théodore de Sykéon* (ed. Festugière), 28, 3: *ζάβαν τρίμιτον, τὴν καλουμένην λουρίκην*; Justinian, Nov. 85, 4: *τὰς λεγομένας ζάβας ἡτοι λωρίκια*. See also n. 65 above.

the eyes uncovered.¹²⁷ Helmets without face-guards but with some form of neck protection—a leather or mail flap, for example—were worn by lighter troops; and the light infantry wore a helmet by itself, with no hindering attachments.¹²⁸ A final type of headgear was the felt *καμελαύκιον*, a thick cap which covered the back of the neck and ears.¹²⁹

The final item of defensive equipment was the horse armour. This was of felt, glued in double or triple layers; or of iron, boiled leather or horn lamellar; additional coverings of felt or lamellar were hung from the saddle to protect the horse's belly. The armour could cover either the forward part of the horse—flank, breast, neck, and head—or its hind parts as well, and reached the knees.¹³⁰

Only three items remain to be examined, the sling, the mace, and the bow. The military writers used two words for sling, *σφενδόνη* or *σφενδοβόλα*. Strictly, the latter referred to the staff-

127. Aventails are called *περιτραχήλια*. If of mail, they are qualified as *αλυσιδωτά*. If these were not available, then iron gorgets, lined with wool, were worn instead. See Leo, *Tact.*, v, 3. The latter reference occurs also in Maurice, but the former, to mail, does not; and it seems likely that while the mail aventails were a contemporary usage, the iron gorget is merely copied from Maurice. Such gorgets are not referred to in other tenth-century sources. Helmets with aventails are referred to as *κόρυθες τελείται* in *Syll. Tact.*, 38, 5; 39, 3; and as *κασίδας σιδηρᾶς καὶ παννὶ ὠχυρωμένας* in the *Praecepta*, p. 11, 12f.

128. The *Sylloge* refers to the first type as *κόρυθες ἀσκεπεῖς ἔχουσαι τὸ πρόσωπον οἱ κόρυθες μὴ τελείται* (38, 7; 39, 9), and to the second as *κόρυθες ἀσκεπεῖς τῷ κύκλῳ* (39, 8). Other terms for helmets are *αὐτοπρόσωπα* (*De Cer.*, 669, 18) and *θωρακίδιον τῆς κόρυθος κύκλῳ ἐξηρημένον* (Anna Comnena, *Alexiad.*, ed. Leib, I, 5, 7). Reiske (*De Cer.*, III, 790) considers that these are two different types of helmet with face-guards, following Du Cange (*Alexiad* [*CSHB*], II, 423–4), but there is no reason to doubt that the two expressions refer to the same thing—a helmet with a mail or lamellar aventail covering face and neck, which could be drawn up to the crown when not in battle.

129. Niceph., *Praecepta*, p. 1. 23–4; *De Cer.*, 353, 16; 670, 3; anon., *De Obsidione Toleranda*, ed. H. Van Den Berg (Leiden, 1947), p. 48. The term was applied to a closed, spherical cap of felt, and referred also to a type of royal headgear, a closed diadem. On its origins and development as such, see *DAI*, II, 652–5; A. Papadopoulos, *Καμελαύκιον*, *EEBS*, V (1928), 293–9. It seems also to have served as a sort of standard for signalling purposes. See Leo, *Tact.*, xix, 42.

130. Leo, *Tact.*, v, 3; vi, 8; *Syll. Tact.*, 39, 6; Niceph., *Praecepta*, p. 11. 16–22. The *Sylloge* (loc. cit.) adds that the horse armour could also be of mail, although this must have been unusual. Cf. *De Cer.*, pp. 81–2, for armoured and caparisoned horses on ceremonial occasions.

sling, the *fustibalus* of Vegetius' time, but the Byzantine writers used it in the ordinary sense. Light infantry were equipped with it, as were some of the heavier troops, and it figured as the reserve missile weapon issued to a large number of soldiers, including archers.¹³¹

As for the mace, this became increasingly popular during the tenth century. Leo hardly mentions it—his soldiers carried axes as their shock weapons—whereas the *Sylloge* describes the infantry as axe-carriers, but the cavalry had the mace (*βαρδούκια* . . . *εἰτ' οὖν σιδηροραῦδια*). In the *Praecepta* the infantry have either maces or axes, and the cavalry have maces which were of iron with three, four, or six flanges on the head.¹³²

Finally there is the bow. Its use declined during the period from Heraclius to Leo VI. As a result a number of battles were lost during the ninth century, for the Byzantines were unable to match the archery of the Turkish mercenaries serving the Caliphate. Leo lamented these misfortunes, and suggested that older legislation enforcing archery practice should be revived, but apparently with no result. Archery was recognized as an important aspect of warfare, of course, and the later tenth-century emperors made sure of a certain level of efficiency by doing away with the notion of a composite lancer and archer, and organizing specific units of bowmen, both horse and foot, to serve among the heavy cavalry and infantry. The *Sylloge* gives some details of the bow, which was 45" to 48" long, with arrows of 27". These dimensions match those of the Hun bow adopted earlier, and as the Byzantine troops are described as having 'curved' bows and are shown in many illuminations equipped with what are clearly composite reflex weapons, it seems clear that the type of bow used remained the same. Only with the arrival of the Seljuks was a new type introduced.¹³³

131. For the staff-sling, see *Veg.*, i, 16; iii, 14; 24; for the sling in the tenth-century treatises, see Leo, *Tact.*, v, 3; vi, 25; 26; *Problem.*, xii, 5; 6; 7; etc; *Syll. Tact.*, 38, 10; Niceph., *Praecepta*, p. 2. 2–3.

132. Leo, *Tact.*, vi, 27; xiv, 84 (*βαρδούκιον/ματζούκιον*); *Syll. Tact.*, 39, 3 (*βαρδούκια/σιδηροραῦδια*); cf. Dain, *Naumachica*, I, 7 (Leo, *Tact.*, xix, 7); VI, 6 (*σιδήρα βαρέα, ὅλον μαζῖτα ζιφοσιδή/ὅλον μαζῖτα ὡς ζιφάρια*); *De Cer.*, p. 670, 16–17 (*βαρέας*); pp. 671, 5; 673, 2 (*βαρέας μεγάλας ἀν μικροτέρας*); *Theoph. cont.*, p. 232, 1–2 (*ρόπαλον*); Niceph., *Praecepta*, p. 2. 1; p. 11. 30f. (*σιδηροραβδία ὀλοσιδήρα*).

133. Leo, *Tact.*, vi, 5 (Maurice, *Strat.*, i, 2. 4); *Syll. Tact.*, 39, 4; Niceph.,

The information contained in the tenth-century treatises therefore gives a full description of the armour and weapons of the various classes of troops. But there is more than literary evidence to illustrate the equipment of this period. Manuscript illuminations, ivories, and references from non-Byzantine writers also provide examples of arms and armour. Illustrations in which the *klibanion* is shown are referred to above, but other types of armour are depicted. A soldier equipped with a *lorikion*, helmet, and aventail, holding a lance, is depicted in the Marciana Iliad.¹³⁴ Helmets are also shown, two sorts predominating: a simple metal or cloth cap, and those with some neck and face protection. In the latter case, either the helmet has a permanently fixed neck-guard and/or nasal, or it has an aventail of mail or cloth attached at the back and sides, as the *κόρυθη ἀσκεπὲς ἔχουσα τὸ πρόσωπον* of the *Sylloge*.¹³⁵ Splinted arm-guards attached to the *klibanion* are frequently shown, and appear to have continued in use until well into the twelfth century. The Madrid Skylitzes has a large number of illuminations which depict soldiers wearing *klibania* and other items which by the time of composition of the manuscript had been superseded by Turkish and western European forms of defence,¹³⁶ and which date to the tenth and eleventh, rather than the thirteenth, century.

Arab writers—poets, chroniclers, and historians—also supply the occasional detail of Byzantine equipment, usually generalized, but giving credence to the descriptions of the *Sylloge* and the *Praecepta*. Thus Mutanabbi, court poet to the Emir Saif al-Daula and veteran of a number of campaigns, describes the Byzantine soldiers as follows: ‘They marched against you covered in iron. One would even have said that they advanced

Praecepta, p. 12. 4f. For the ‘curved bows’ see the fragment of Mutanabbi in A. A. Vasiliev, *Byzance et les Arabes* (Brussels, 1950), II, ii, p. 344, v. 36.

134. Illustrated in Lefèvre de Noettes, op. cit., fig. 347. For other examples of long mail coats, see the references in note 81 above, illuminations of the later ninth and tenth centuries.

135. See notes 123, 125.

136. See C. Estopañan, *Skylitzes Matritensis*, I (Barcelona/Madrid, 1965), figs. 11–13, 33–34, etc. Compare, for example, the miniatures in the Psalter of Theodore of Caesarea (now in the British Museum), illustrated in Oman, *Art of War*, I, pls. v, vi, dated to the middle of the eleventh century.

on horses with no legs,' a striking reference to the heavy cavalry on their armoured horses. The light reflected from their armour, so that the onlooker confused the men with their weapons, 'for their clothes and headgear were of iron like their swords'. In a battle in 956, the Byzantines were defeated and their commander escaped death only because 'he wore a long mail coat which protected him from the many lance blows he received'. Ibn Hauqal wrote in the last years of the tenth century that the Banu Habib, a clan related to the Hamdanids and famed for their ability in war, deserted to the Byzantines, mounted on well-bred horses and 'armed from head to foot, with coats of mail and breastplates (*klibania* or plates strapped over the mail), brocade capes, sabres, lances, and other weapons'.¹³⁷ Given a certain amount of exaggeration, these references show the impact made by the Byzantine heavy cavalry and the nature of the equipment available.

The arms and other equipment described above continued in use during the eleventh century, although it is quite clear that the military machine was no longer as efficient or as well-equipped as its predecessor of the tenth century. Types of armour and weapons did not alter appreciably until well into the twelfth century, a change which resulted from the employment of western mercenary soldiers who brought their own equipment with them, rather than the wholesale adoption by the native soldiers of the empire of new types and styles. It would be interesting to know to what extent foreign *pronoia* holders adopted the Byzantine panoply.

Conclusion: The historical background

Three main phases can be detected in Byzantine military history within the period under discussion. The first ended during the seventh century and was distinguished by the existence of an effective field army or armies, relatively well-equipped and -drilled, made up of the composite horse-archers/lancers developed under Belisarius and Maurice, supplemented by heavy and light infantry and foreign allied forces. These armies, which operated in conjunction with local garrison soldiers and with the *limitanei* along the frontiers, were centrally controlled and administered through their commanders from

137. See Vasiliev, op. cit., 2, ii, p. 333, vv. 16–17, p. 347, v. 44, and p. 420.

Constantinople. They were made up of volunteers who were provided with their supplies and with a certain amount of their equipment by the state, although conscription for special campaigns was a usual practice. They were granted a number of benefits in terms of tax-exemptions and exemptions from particular services for themselves and certain members of their families. Military skills were maintained at a high level, for numerous contacts with a variety of external foes gave an impetus to innovation and experiment both in tactics and in strategy.¹³⁸

The second phase begins with the collapse of this centralized system and the enforced localization of military command and recruitment as the result of repeated Arab, Bulgar, and Slav attacks during the later seventh and early eighth centuries. Troops were paid and recruited locally, although central supervision by no means disappeared. The armed forces of an area consequently comprised soldiers who were for the most part trained only in basic and traditional military skills. The evidence strongly suggests that the more technical aspects of warfare, such as archery, especially mounted archery, or the production of chain mail, on a large scale, declined in many areas. The production of weapons and equipment was especially affected, for the arms factories seem to have been abandoned during the seventh century.¹³⁹ This period also saw the Empire

138. On the organization of the late Roman field and frontier armies, see A. H. M. Jones, *The Later Roman Empire, 284–602* (Oxford, 1964), pp. 654ff.; E. Stein, *Studien zur Geschichte des Byzantinischen Reiches* (Stuttgart, 1919), pp. 117ff.; K. Hannestad, 'Les forces militaires d'après la guerre Gothique de Procope', *Classica et Medievalia*, XXI (1961), 136–83; J. Maspéro, 'φοιδεράτοι et σπαριώται dans l'armée byzantine', *BZ*, XXI (1912), 97–109; J. L. Teale, 'The Barbarians in Justinian's Armies', *Speculum*, XL (1965), 294–322.

139. On the gradual collapse of the sixth-century administration and the development of the early *themata* see, *inter al.*: J. Karayannopoulos, *Die Entstehung der byzantinischen Themenordnung* (*Byzantisches Archiv*, Heft 10, Munich, 1959); *idem*, 'Über die vermeintliche Reformtätigkeit des Kaiser Herakleios', *JÖBG*, x (1961), 93–7; A. Pertusi, 'La formation des Thèmes byzantines', *Berichte zum XI Internationalen Byzantinisten Kongress* (Munich, 1958), I, 1–40. On the recruitment of the *tagmata*, see H. Ahrweiler, 'Recherches sur l'administration de l'Empire byzantin aux IX^e–XI^e siècles', *Bulletin de Correspondance Hellénique*, LXXXIV (1960), 24ff.; cf. *Theoph.*, pp. 462, 463 for the recruitment of soldiers from the Anatolik Theme into the *Scholai* under Constantine V. For a reassessment of the military value of the Themes, see W. E. Kaegi, 'Some Reconsiderations on the Themes: seventh–ninth centuries',

in conflict with only two main foes—the Arabs and the Bulgars—which, with this localization, produced a stagnation in technical skills and reduced the need to innovate or experiment; although a sophisticated technique was developed for dealing with the enemy, especially in Asia Minor, at a strategic level.¹⁴⁰ Only in the ninth century, when an increase in contacts with the steppes took place, both in Byzantine and Arab territory, was there a new stimulus to military development, and this renewal marks the opening of the third phase.

The revival of archery (through the recruitment of Turkish and other central Asian mercenaries) among the soldiery of the empire was accompanied by a consolidation of Byzantine territory and the reimposition of central authority under the later ninth-century emperors. This made it possible for the empire to take advantage of internal dissensions within the Caliphate and promote an offensive policy. But despite early successes, the policy came to fruition only when it was seen that the Theme armies had to be placed under a more effective central command than hitherto. Offensive policies need offensive tools, and the light, all-purpose cavalry forces which had developed after the mid-seventh century were no longer sufficient to ensure success. The process of change with regard to the administration and command structure of the army has been examined elsewhere, but it is clear that these developments marked a decisive break with what had become the traditional roles associated with the *Tagmata*, the *Themata*, and the *Kleisourai*. During the course of the tenth century, the Domestic of the *Scholai* rapidly increased his authority; more and more units of mercenaries were raised and equipped by the government for expeditions; and the Theme armies were finally reduced to the status of a provincial militia, a sizeable proportion of their number being recruited as full-time soldiers, to serve in

JÖBG, XVI (1967), 39–53. For arms production, compare the system outlined in novel 85 of Justinian with that described at *De Cer.*, p. 657, 12ff.

140. A recent assessment of this warfare has been made by H. Ahrweiler, 'L'Asie Mineure et les invasions arabes (VII^e–IX^e siècles)', *Revue Historique*, CCVII (1962), i, 1–32; for techniques of frontier warfare, see Leo, *Tact.*, xvii; xviii, 138ff.; Nicephori Phocae *De Velitatione Bellica*, in *Leo Diac. (CSHB)*, pp. 179–258.

thematic detachments to the field armies.¹⁴¹ Admittedly, this picture over-simplifies a much more complex development, but it is substantially correct. And the results can be seen in the descriptions we have of the later tenth-century army in action: shock regiments of heavy cavalry, the men armed from head to foot; the increase in use and effectiveness of horse- and foot-archers; the adoption of new tactics on the battlefield; and the discipline which bound the forces together. The change is also marked in a less violent manner, by the considerable revival of interest in the military sciences—tactics, strategy, and mechanics. It is interesting to note that while Nikephoros Phokas reputedly regarded with contempt western European heavy cavalry, he nevertheless placed a great deal of emphasis on raising such troops for his own armies, a fact which illustrates both the renewal of interest in methods of waging war, and the re-emergence of the Byzantine armed forces from comparative isolation.¹⁴²

What position do the military treatises hold in this development? Two points should be made clear. The first is that the treatises in question, although consciously modelled

141. On the appearance of Turkic mercenaries in the Caliphate and later in Byzantium, see for example *Theoph. cont.*, p. 126, 23f.; *Genesius*, p. 68; and references in note 100 above. For the increase in the number of mercenary troops hired for campaigns, see *Theoph. cont.*, p. 81; p. 112; *Georg. Mon. cont.*, p. 793; *Symeon Mag.*, p. 624; p. 627. The revival of an offensive policy is described in G. Ostrogorsky, *History of the Byzantine State* (Oxford, 1968), pp. 210ff.; and note the request of Theophilos to the King of the Franks for military aid in 839: *Theoph. cont.*, p. 135, 1–6. For the reorganization of the high command and the effect on the theme forces, see Ahrweiler, 'Recherches', 46ff.; 56ff.; N. Oikonomides, *Les Listes de Préséance Byzantines des IX^e–X^e Siècles* (Paris, 1972), pp. 329, 333ff. On the increase in the number of *tagmata*, see Ahrweiler, 'Recherches', pp. 27ff.; and Oikonomides, *op. cit.*, pp. 327–8, 330, 332–3; and for Nikephoros II's reforms, see Ahrweiler, 'Recherches', pp. 16ff.

142. For the new heavy cavalry and army in action see, for example, the accounts of the battles of Dristra, in *Leo Diac.*, pp. 140–1; 153–6, etc. For archers, see the Arab references in Vasiliev, *op. cit.*, 2, ii, pp. 339, 344, 385. Note that the Arabs (excluding their Turkish mercenaries) are not archers: *ibid.*, p. 336. Nikephoros' attitude to the west in *Liutprandi Legatio ad Nicephorum Phocam* (in *Liutprandi Episcopi Cremonensis Opera*, ed. Joseph Becker, Hanover/Leipzig, 1915), xi. For the revival of interest in military theory, see A. Dain, 'Les stratégistes byzantins', *Travaux et Mémoires*, II (1967), p. 353, and on the comparative merits of the treatises examined, *ibid.*, pp. 343–6, 354–8, 370–1.

on similar Hellenistic manuals, nevertheless deal with contemporary affairs and attempt, with varying degrees of success, to describe them. The second concerns the basic aims behind the writing. Thus, whereas Nikephoros (or whoever actually wrote the *Praecepta*) wanted to give a concise and accurate picture of how the soldiers of his time were equipped, Leo tended to confuse facts with ideals. The distinction is important, for the difference in approach gives some insight into the conditions under which the treatises were written. It seems clear, for example, that while both the *Sylloge* and the *Praecepta* stated known facts, and Maurice attempted to regulate a conscious reform, Leo made only a tentative approach to suggest how the soldiers ought to be equipped (although there is no doubt that his description applied to some of the imperial troops): his very reliance upon the *Strategikon* of Maurice suggests this. Constant reiteration of phrases such as 'if it is possible' or 'if these can be obtained' imply some uncertainty. The reasons lie in the fact that he wrote at what we can recognize as the beginning of a period when new policies were being shaped and when the armies of the Empire were undergoing reform and reorganization. In this situation Leo's treatise can readily be seen as a first attempt to provide instructions and advice to suit the new circumstances.¹⁴³

Finally, there is the position of Byzantine military technology in relation to that of other peoples. It has already been shown that Byzantine arms and armour did not exist in a vacuum, but were related in every way to types prevalent outside the empire. A certain uniformity is imposed upon the various types of armour because of the construction techniques used. Coats of mail, for example, however widely separated their area of use, rarely differed in their general appearance. Lamellar and scale armours likewise are found only in certain specific forms, using a limited number of materials. A second point is that the availability of raw materials and technical skills for the production of armours limited certain types to certain areas. On the steppes, leather and felt were the most easily obtained, while mail was the most difficult. In Persia and the Middle East, all types were produced, but the presence of large, settled populations of craftsmen enabled the rulers to place more

143. Cf. Basil I's reorganization in *Theoph. cont.*, pp. 265, 3–16; 266, 6–9.

reliance on mail or finely decorated metal armours. In Byzantium, settled populations again made it possible to produce mail, while contacts with the steppes to the north, at different times, meant that here, as in central Asia and north-east Persia, composite armours developed which owed something to both the nomadic and the settled worlds. The armour of Byzantine soldiers as described in Maurice and in the tenth-century treatises is often similar, on a very general level, to that which is illustrated in central Asian contexts: while the Byzantine development was a combination of late Roman, steppe, and Persian styles, that in central Asia combines the steppe influence with that of China and northern Persia.¹⁴⁴ During periods of comparative isolation few new techniques appear, and local needs dictate styles and development. Thus in the later seventh and up to the middle of the ninth century, when the empire was effectively isolated from the steppes by the Bulgars and faced only one enemy in the east, the Arabs, only the *klibanion*, which grew out of the older lamellar coat and seems to have been a purely internal development, was new. With the renewal of contacts in the second half of the ninth century, however, the sabre and later the heavy cavalryman's panoply were introduced, or revived, along with the reappearance of the bow on a large scale. It must also be emphasized that while Byzantine tactics and equipment were very much influenced by the nomads during the later sixth century, the nature of the Byzantine economy, based on a settled agricultural tradition with (by steppe standards) only comparatively limited areas devoted to large-scale stock raising and no indigenous nomadic population, meant that these influences, which were the product of an economy and life-style exclusive to the Eurasian steppes, could never really take root and flourish. This partly explains why horse-archery declined and had to be artificially revived, a decline which was exaggerated by the fact that neither the Arabs nor the Bulgars seem to have placed much emphasis on the bow. It is clear that even in the 930s, when the reforms were being taken seriously, the Byzantine forces were by no means adequately trained or equipped to deal with the tactics of the Pechenegs.

¹⁴⁴. For detailed comparison of, for example, types of arm-guards, where the Byzantines followed steppe fashion to a large extent, see above, note 127.

The vital difference between the soldiery of the sixth century and that of the tenth century, however, lay in the source of recruits. For while a majority of the soldiers of the earlier period, although by no means all, had been recruited from Byzantine territory and had been deployed against foes with whom they could have no common loyalty, a large proportion of those of the later period were recruited from areas within the Empire which under certain conditions might reject imperial authority, or from foreign mercenaries. While success lasted and while no community of interest could unite mercenary with enemy, all went well. But once the Byzantine local forces (which still formed the real backbone of the armies) had been reduced in power and effectiveness, and the Empire had to rely almost wholly on mercenary troops, then disaster struck.¹⁴⁵ Manzikert, although it became a worse defeat as a result of Byzantine inaction immediately afterwards, nevertheless highlighted the faults of the army of the period, an army descended from those of Basil II, Tzimiskes, and Nikephoros II which had accomplished so much. Only as long as local officers and magnates such as Kekaumenos identified their own preservation with that of the empire was the maintenance of imperial military strength ensured.

To examine the effects of the tenth-century offensive and its implementation is beyond the scope of this paper, however.¹⁴⁶ We must be content to note that Byzantine military technology was subject to influences other than the purely military, and that the changing styles of military equipment often reflected significant fluctuations in the economic and political fortunes of the Byzantine state during the period from the sixth to the tenth century.

University of Birmingham

145. For the defeat of 934, see Macoudi, *Les Prairies d'Or*, II, ed. C. Barbier de Maynard, Pavet de Courtelles (Paris, 1863), pp. 62–3. See also W. E. Kaegi, 'The Contribution of Archery to the Conquest of Anatolia', *Speculum*, XXXIX (1964), 96–108; Ostrogorsky, *op. cit.*, pp. 320ff.; Ahrweiler, 'Recherches', 46.

146. For the latest examination of this topic and on the question of the political activity of the Byzantine army, see Walter E. Kaegi, 'Patterns of Political Activity of the Armies of the Byzantine Empire', in *On Military Intervention*, ed. Morris Janowitz (1971), esp. pp. 22f.